



## Delayed density-dependent prevalence of sin nombre virus antibody in Montana deer mice (*Peromyscus maniculatus*) and implications for human disease risk

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### Abstract:

American hantaviruses cause a severe respiratory disease known as hantavirus pulmonary syndrome (HPS). In the United States, Sin Nombre virus (SNV), carried by the deer mouse (*Peromyscus maniculatus*), is the etiologic agent in the majority of HPS cases. The relationship between deer mouse population density and SNV infection prevalence in deer mice is poorly understood. Our purpose was to clarify this relationship by demonstrating the existence of delayed-density-dependent prevalence of SNV infection in populations of wild deer mice. We also explored the relationship between SNV infection in deer mouse populations and the incidence of human HPS. The study population was 3,616 deer mice captured on 10 mark-recapture grids in Montana during May and September, 1994-2004. Using multivariate logistic regression analysis, we found a strong association between deer mouse population density in fall (September) and SNV antibody prevalence in deer mice the following spring (May). Other characteristics associated with SNV infection in deer mice in spring were: (1) presence of at least one infected deer mouse in the population the previous fall, (2) male gender, (3) adult age class, (4) presence of scars, (5) grassland and logged habitats, and (6) elevations below 1,300 m. There was a strong association between concurrently measured SNV antibody prevalence in deer mice and probable exposure of human HPS cases during the same time period. Human cases were more likely to occur during seasons when SNV antibody prevalence was at least 10% in deer mouse populations. These findings suggest that fall rodent population parameters could be used to help guide prevention efforts the following spring.

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### Resource Description

#### Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

#### Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Temperature

# Climate Change and Human Health Literature Portal

**Temperature:** Fluctuations

**Geographic Feature:** ☒

resource focuses on specific type of geography

None or Unspecified

**Geographic Location:** ☒

resource focuses on specific location

United States

**Health Impact:** ☒

specification of health effect or disease related to climate change exposure

Infectious Disease

**Infectious Disease:** Zoonotic Disease

**Zoonotic Disease:** Hantavirus Pulmonary Syndrome, Other Zoonotic Disease

**Zoonotic Disease (other):** sin nombre virus

**Mitigation/Adaptation:** ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

**Model/Methodology:** ☒

type of model used or methodology development is a focus of resource

Exposure Change Prediction

**Resource Type:** ☒

format or standard characteristic of resource

Research Article

**Timescale:** ☒

time period studied

Short-Term (

**Vulnerability/Impact Assessment:** ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content